

A RHENISH Fishery Society has just been founded at Cologne. It will direct its attention not only to the Rhine fisheries, but its programme is a most universal one, comprising even the furtherance and support of ichthyological research as well as the establishment of ichthyological stations in various countries.

MR. BALLER of the China Inland Mission has lately made a journey in the little-known province of Kweichow at the time when the people were engaged on their opium harvest, and he thus describes the process:—A small three-bladed knife is used to make an incision in the poppy-head as soon as the petals fall off. The drop or two of milky juice that oozes out is after a little while scraped off with a small curved knife into a bamboo tube, and a fresh incision made. The process is repeated until the supply is exhausted. The juice thus collected is dried in the sun, when it turns jet black, and is then ready for the market.

OUR ASTRONOMICAL COLUMN

THE COMETS OF HARTWIG AND SWIFT.—MM. Schulhof and Bossert have investigated the elements of comets 1880 *d* and *e*, discovered respectively by Dr. Hartwig at Strasburg on September 29, and Mr. Lewis Swift at Rochester, New York, on October 11. Prof. Winnecke had conjectured that Hartwig's comet might have been identical with the comets of the years 1382, 1444, 1506, and 1569, with a period of revolution of 62½ years. MM. Schulhof and Bossert formed six normal positions between September 30 and November 29 from observations at Paris, Strasburg, Berlin, Leipsic, Kiel, Kremsmunster, Lund, Florence, Marseilles, O'Gyalla, Clinton, and Washington, and on varying the distances from the earth at the first and fifth place until the other normals were represented as closely as possible, arrived at an elliptical orbit, but with a period of 1280 years: this result is necessarily uncertain under the circumstances, but it nevertheless appears to render so short a revolution as 62½ years in the highest degree improbable.

With respect to Swift's comet, taking as the fundamental data the Odessa observation on October 31, a mean of Dunecht, Paris, and Strasburg on November 9, and an observation at Paris on November 27, it is found that, assuming only one revolution to have been accomplished between 1869 and 1880, or that the period is 10·96 years, the middle place cannot be represented with sufficient precision; when the error is diminished in longitude, it is increased in latitude. On the hypothesis that the period is 5½ years, or that two revolutions are included in the above interval, the error in latitude is greatly diminished, but still exceeds thirty seconds of arc. This, while indicating that the second hypothesis is more probable than the first, is regarded by MM. Schulhof and Bossert as rendering so short a period as 3½ years possible, though it is admitted that it may well be due to errors of observation. It must be borne in mind that the comet has always presented itself as a faint diffused object, without that degree of condensation necessary to insure precise observation. The following is the ellipse of 5½ years' period:—

Perihelion passage, 1880, November 8·00011 G.M.T.

Longitude of perihelion	43° 4' 33"	} M. Eq. 1880·0
" " ascending node	296° 51' 33"	
Inclination	5° 23' 32"	
Angle of eccentricity	41° 3' 25"	
Logarithm of semi-axis major	0·492684	

With these elements the perihelion distance will be found to be 1·0671, and the aphelion distance 5·1518, and the heliocentric latitude at aphelion — 4° 6' 6", whence we find the distance from the orbit of Jupiter to be 0·53.

MM. Schulhof and Bossert propose to continue their investigation when further observations are available: meanwhile it may be remarked that their ellipse of five and a half years is likely to afford positions sufficiently near the truth to insure the observation of the comet as long as it is within reach of our telescopes, and it may be suggested to those who are in possession of powerful instruments that they will render an important service in determining places of this comet as long and as accurately as practicable.

THE NOVEMBER METEORS.—Notwithstanding much interference from clouds the observers at Moncalieri, who watched for meteors during the nights of November 12-14, consider that

they obtained evidence of the increasing density of the Leonid-stream, thus confirming observations made last year in England and the United States. One of these meteors appeared larger than the planet Jupiter, with an intense blue light, and a bright train of the same colour. It is added: "La lumière zodiacale d'opposition était très brillante vers l'orient, sur le fond pur de ciel, s'élevait jusqu'au delà de la queue de Lion."

NEAR APPULSE OF JUPITER TO A FIXED STAR.—On the evening of November 20 Jupiter must have approached very near to the star B.D. + 2° No. 97, rated 7·7 in the *Durchmusterung*, and 7·9 on December 17, 1856, when it was observed on the meridian at Bonn, indeed the resulting place of the star would bring it almost into contact with the limit of the planet about the time of conjunction in right ascension (9h. 4m.), but small errors of the star's position and tables of Jupiter may have combined to leave it at an appreciable distance from the limb; perhaps some reader of NATURE may have determined micrometrically the nearest approach. The apparent place of the star on November 20 was in R.A. oh. 38m. 49·44s., Decl. + 2° 32' 59"·9.

BIOLOGICAL NOTES

ANABÆNA LIVING IN BOTRYDIUM.—It is now well known that many plants belonging to the group of the Nostocs flourish within the cells of other plants. Thus they are to be found in the petioles of the leaves of Gunnera, in Lemna, in Anthoceros, in Blasia, and in Azolla; and it was to be expected that they would equally find themselves at home in the cells of even more lowly organised plants. An instance of this latter, not without interest, has been noticed by Dr. L. Marchand, who recently collected a Botrydium at Montmorency, which, on being examined under the microscope, was found, instead of containing the usual mass of granular chlorophyll, to be filled with a chain of moniliform filaments, presenting all the characters of the chaplets of a Nostoc or Anabæna. These filaments were composed of cells, some oblong with yellowish heterocysts, and they did not fill the entire cavity of the Botrydium cell, but seemed to adhere to its inner walls. The Botrydia plants were perfect; the root-like prolongations, as well as the rest of the plant, were perfectly closed. How then did these foreign bodies get in? This is not a question easy to answer, but it is one well worthy of being investigated. Dr. Marchand calls attention to the remarkable figure of Mr. E. Parfitt in "Grevillea" (vol. i. p. 103, pl. vii.), in which there is now little doubt, with the light thrown on the subject by Dr. Marchand's specimens, that there is represented our common species of Botrydium with a parasitic, or better, an endophytic Anabæna. No doubt the cells of the Anabæna in Parfitt's figure are badly represented, but the observation made in Parfitt's paper would seem now not to be without a special interest of its own.

MESEMBRYANTHEMUM NOT MESEMBRYANTHEMUM.—Prof. Asa Gray, in the *Botanical Gazette* (Indiana), vol. v. Nos. 8 and 9, p. 89, thus writes:—This word is properly written Mesembrianthemum, by Jacob Breyne, who made the name, and by Dillenius, who took it up, both giving the derivation from *Mesembria*, mid-day, alluding to the time in which the blossoms open. But both Breyne and Dillenius themselves very often wrote it Mesembryanthemum; Linneus, adopting this latter, became consistent by making a wrong and far-fetched derivation to match the orthography. Among systematic writers Sprengel almost alone keeps to the correct orthography, but Webb insists on it. The younger Breyne, in his edition of his father's "Prodromus," has a note about it (p. 81). He mentions an excuse for changing the orthography, namely, "that some species do not open their blossoms at noontide," but intimates that Linneus' derivation from the insertion of the corolla around the middle of the germ is open to the same objection. Prof. Asa Gray adds, "if heeded, this kind of objection would be fatal to very many generic names."

CHLOROPHYLL IN THE EPIDERMIS OF PLANTS.—Adolf Stohr contributes to the *Scientific Proceedings* of the Vienna Academy a very interesting paper on the occurrence of chlorophyll in the epidermal tissue system of the leaves of flowering plants. He sums up a detailed account as follows:—While the epidermis of the aquatic submerged Phanerogams is usually regarded as containing chlorophyll, the epidermis of the green organs of the terrestrial Phanerogams is, on the contrary, considered to be

destitute of chlorophyll. This at least is the most prevalent view. Exceptionally, submerged Phanerogams are found with an epidermis destitute of chlorophyll, and there are also some exceptions to the general rule quoted about the leaves of terrestrial Phanerogams. Now it happens that the at present prevailing view is only right in one respect, for up to the present, observations prove the regular appearance of chlorophyll in the outer layer of submerged Phanerogams. The second half of the prevalent view should be completely reversed, for the appearance of chlorophyll in the epidermis of the green organs of Phanerogams is the rule, and with few exceptions. The results of Stohr's researches lead to the following:—1. The epidermis of the green organs of the broad-leaved Gymnosperms, and of by far the most of the terrestrial Phanerogams, contains chlorophyll. 2. Chlorophyll appears regularly to be absent from the green organs of the needle-leaved Gymnosperms and the terrestrial Monocotyledons. 3. Chlorophyll is in most cases only to be found in the under surface of the leaves, but is also to be met with in the leaf-petioles and stipules. It remains in such position during the whole life of the organ. 4. Chlorophyll is seldom to be found in the upper and lower surfaces of the leaves at the same time. In most cases one can see that the chlorophyll of the cells of the epidermis of the upper surface of the leaf is quickly destroyed upon its formation, by the effect of a too intense light. 5. So far as the process of the evolution of the chlorophyll bodies was observed, the latter showed themselves as starch-chlorophyll bodies. M. Stohr gratefully acknowledges that these investigations were undertaken at the suggestion of Prof. Wiesner, the author of a memoir, "Ueber die natürlichen Einrichtungen zum Schutze des Chlorophylls der lebenden Pflanze." The leaves of nearly one hundred species of plants were carefully examined, and full details of these examinations are given in the tables that accompany M. Stohr's memoir. The investigations were carried out in the botanical-physiological laboratory of the University of Vienna. (*Sitzungsberichte d. k. Akad. Wissenschaften—mathem.-naturw. Cl.*, 79 Bd., S. 87.)

BLOOD VESSELS OF VALVES OF THE HEART.—Recent researches by Dr. Langer (Vienna Acad. *Anz.*) prove that several mammalian genera (pig, dog, bullock) have a fully-formed blood-vascular system both in the semilunar and the atrioventricular valves. On the other hand an examination of about 100 human hearts (of children and adults) discovered blood-vessels in the heart-valves only in one case, that of a woman of sixty, in whom they were evidently the result of a pathological process. Dr. Langer explains the difference by a difference in the mode of formation of the valves.

LIGHT AND THE TRANSPIRATION OF PLANTS.—Dr. Comes (Naples Academy) finds, *inter alia*, that light favours transpiration; that a little after midday transpiration is at its maximum; that, other things equal, that organ transpires most which is most intensely coloured, and it emits most water when exposed to that part of the solar spectrum where it absorbs most light; and that only those luminous rays which are absorbed favour transpiration of an organ (not the inactive rays); so the transpiration is minimum under the rays coinciding in colour with that of the organ, and maximum under the complementary rays.

PINGICULA ALPINA.—Prof. Klein of Buda-Pesth publishes in the last part of Cohn's *Beiträge zur Biologie der Pflanzen* an interesting memoir on this plant. 1. It appears in two forms: one has bright green leaves; the other has more or less reddish-brown coloured ones. These forms however appear only to possess the value of local varieties. 2. *Pinguicula alpina* is, like the other species of *Pinguicula*, an insectivorous, *i.e.* flesh-eating plant, but is partly also a plant-eating one. 3. Its roots are simple, *i.e.* they do not branch, and they possess notwithstanding a pericambium. The cells of the bast layer have handsome, for the most part doubly-ridged longitudinal walls, and are the first formations that differ from the primary meristem of the end of the root. The greatest part of the root remains in respect to the tissue formation in an undeveloped and almost embryonic condition. 4. The caulome contains between the pith and bark a vascular ring which is characterised by very short-jointed vessels: these joints are bound together at the points of contact, and their cross walls are broken through by one single circular opening. The bundles of vessels belonging to the roots spring partly out of the caulomic vascular ring, partly out of the leaf spur. 5. The original bending in of the edges of the leaves can be regarded as an advantageous arrangement in respect to the catching of insects,

as insects cannot easily get over the edge of the leaf, and can therefore also be generally caught under it. 6. The cells of the epidermis of the leaf contain no chlorophyll, but the green-leaved specimens contain a colourless sap and the red-leaved ones a reddish sap. Besides they always possess a cell nucleus in which crystalloids are to be found. 7. The edge of the leaf is transparent, and consists of a single row of epidermis cells. 8. The epidermis of the leaves contains as well on the upper as on the lower side tolerably numerous stomates, which are only wanting on the outermost edge. Their manner of formation corresponds mostly to that observed in *Thymus*; it shows however some deviations. The stomate is surrounded by a narrow edging which is more strongly cuticularised than the outer walls of the epidermis cells. The cells of the stomates contain no crystalloids, but only a few very small chlorophyll bodies. 9. The epidermis of the upper surface develops two kinds of glands with and without stalks. The glands with stalks consist of a basal cell projecting above the epidermis; out of this proceeds a one to four-celled half spherical columella, on the top of which a glandular body, consisting of a layer of radially-placed cells, is placed cap-like; the stalkless glands are similarly built, only the stalk is wanting, the columella is conical, and the glandular body does not as a rule project more than half over the epidermis. The process of development is similar in both glands. 10. Stalkless glands appear also on the lower side of the leaf. They are only feebly developed, and their cap portion hardly projects over the epidermis. From their presence it can be deduced that the various kinds of *Pinguicula* once only possessed stalkless glands; from which in process of time both the stronger developed stalkless glands and those also with stalks became developed on the upper side of the leaf, by which the capacity of the leaves for catching and digesting insects was at the same time perfected. In connection with this, one can infer a somewhat similar theory about *Utricularia* and *Aldrovanda*, and even about *Dionæa* and *Drosera*. 11. The bundles of vessels belonging to the leaves are branched out in netlike veins, and anastomose chiefly with one another. The veins at the ends unite near the edge of the leaf into a sympodial layer, from which numerous veins go out directed to the edge of the leaf and end in enlarged spirally thickened cells, which cells sometimes border directly on the epidermis cells belonging to the edge of the leaf or are separated from them by one or more cells. 12. The tracheal vessels of the leaves, as well as of the other parts of *Pinguicula alpina* never contain air, but either a watery fluid or a yellowish-brown resinous-looking substance. This circumstance, together with the strange branching of the tracheal vessels in the edge of the leaf particularly adapted to catching insects seem to prove (or show) that the tracheal vessels serve for the transport of a substance that stands perhaps in direct connection with the function of the leaves. 13. The mesophyll cells form among one another tolerably large interstices filled with air, and contain generally chlorophyll bodies in abundance. 14. Starch is to be found in the chlorophyll bodies of *P. alpina*, and also in the small stems and roots of the hibernating plants, when it appears in small compressed nuclei. 15. Glands with and without stalks appear in the flower stalks as well as in the flowering parts.

GEOGRAPHICAL NOTES

At a meeting of the Geographical Society on Monday evening Capt. T. H. Holdich, R.E., of the Survey of India, read a very interesting paper on the geographical results of the Afghan campaign, in which, after giving a sketch of the features of the country, he summed up the additions lately made to our knowledge. These are very considerable, for in the last two or three years he and Major Woodthorpe with their staff have surveyed and mapped from 25,000 to 30,000 square miles of country. Some of the more important facts ascertained are the facility with which practicable roads can be made through the passes of Afghanistan, and the comparatively low elevation of those of the Hindu Kush, which, according to Capt. Holdich's view, would offer no real barrier to the advance of a properly-equipped army. Capt. Holdich hinted that the further mapping and survey of the country were being continued by native explorers attached to the Survey of India, and he thought that in a few years' time it would be known from end to end, and that our surveys would then join on to those of the Russians north of the Hindu Kush. Capt. Holdich remarked also on the curious intermingling of races in some parts of Afghanistan, and in the ensuing discussion Mr. Blanford, late Director of the Geological